Modeling Plasma Flows Around a Small-Scale Phobos-Like Obstacle Using a 2-D Grid-Free Code. A. P. Rasca[1,2], M. I. Zimmerman[3], and W. M. Farrell[2], [1]NASA Postdoctoral Program, [2]NASA/Goddard Space Flight Center, [3]Applied Physics Laboratory.

Recent studies examining the effects of extreme solar events on the lunar plasma environment show enhanced concentrations of pick-up/reflected ions in the solar wind and electric field development in shadowed craters and wake regions near the poles and terminators, resulting in hazardous electrostatic charging at the surface. The same solar drivers regulate plasma and charging environments around small airless bodies such as asteroids and moons of Mars. Finding safe ways to dissipate accumulating electrostatic charge on human systems and equipment is a critical requirement for future exploration of these airless bodies. We present a series of numerical simulations using a grid-free 2-D plasma code to model the plasma flow and near-surface environment around an airless Phobos-like body of varying size, focusing on the wake refilling process and resulting near-surface electric fields. We compare results using both nominal solar wind conditions in the vicinity of Mars and plasma parameters measured by the MAVEN spacecraft during an extreme solar event on 8 March 2015.